

LGS UFSAR

CHAPTER 11 - RADIOACTIVE WASTE MANAGEMENT

TABLE OF CONTENTS

11.1	<u>SOURCE TERMS</u>
11.1.1	Fission Products
11.1.1.1	Noble Radiogas Fission Products
11.1.1.2	Radiohalogen Fission Products
11.1.1.3	Other Fission Products
11.1.1.4	Nomenclature
11.1.2	Activation Products
11.1.2.1	Coolant Activation Products
11.1.2.2	Noncoolant Activation Products
11.1.3	Tritium
11.1.4	Fuel Fission Production Inventory and Fuel Experience
11.1.4.1	Fuel Fission Product Inventory
11.1.4.2	Fuel Experience
11.1.5	Process Leakage Sources
11.1.6	References
11.2	<u>LIQUID WASTE MANAGEMENT SYSTEM</u>
11.2.1	Design Bases
11.2.2	System Description
11.2.2.1	System Operation
11.2.2.1.1	Equipment Drain Subsystem
11.2.2.1.2	Floor Drain Subsystem
11.2.2.1.3	Chemical Waste Subsystem
11.2.2.1.4	Laundry Drain Subsystem
11.2.2.2	Process Equipment Description
11.2.2.2.1	Pumps
11.2.2.2.2	Tanks
11.2.2.2.3	Filters
11.2.2.2.4	Demineralizers
11.2.2.2.5	Radwaste Evaporators (abandoned)
11.2.2.2.6	Piping
11.2.3	Radioactive Releases

LGS UFSAR

TABLE OF CONTENTS (cont'd)

11.3	GASEOUS WASTE MANAGEMENT SYSTEMS
11.3.1	Design Bases
11.3.2	System Description
11.3.2.1	Offgas System
11.3.2.1.1	General
11.3.2.1.2	Process Flow Description
11.3.2.1.3	System Design Considerations
11.3.2.1.4	Component Description
11.3.2.2	Other Radioactive Gas Release Paths
11.3.2.2.1	Primary and Secondary Containment
11.3.2.2.2	Radwaste Enclosure
11.3.2.2.3	Turbine Enclosure
11.3.3	Radioactive Releases and Estimated Doses
11.3.4	References
11.4	<u>SOLID WASTE MANAGEMENT SYSTEM</u>
11.4.1	Design Bases
11.4.2	System Description
11.4.2.1	System Operation
11.4.2.1.1	Wet Solid Waste Processing
11.4.2.1.2	Concentrated Liquid Waste Processing
11.4.2.1.3	Dry Solid Waste Inputs
11.4.2.1.4	Irradiated Reactor Internals
11.4.2.2	Process Equipment Description
11.4.2.2.1	Pumps
11.4.2.2.2	Tanks
11.4.2.2.3	Piping
11.4.2.2.4	Centrifuges
11.4.2.2.5	Discharge Chute Assemblies
11.4.2.2.6	Capping Machines
11.4.2.2.7	Solidification and Dewatering Equipment
11.4.2.2.8	Decontamination Station Equipment
11.4.2.2.9	Hydraulic Press (DELETED)
11.4.2.2.10	Handling Equipment
11.4.2.3	Expected Volumes
11.4.2.4	Packaging
11.4.2.4.1	HIC Service
11.4.2.4.2	HIC Material
11.4.2.4.3	HIC Integrity
11.4.2.5	Storage Facilities
11.4.3	References

LGS UFSAR

TABLE OF CONTENTS (cont'd)

11.5	<u>PROCESS AND EFFLUENT RADIOLOGICAL MONITORING AND SAMPLING SYSTEMS</u>
11.5.1	Design Bases and Specific Requirements
11.5.1.1	General Design Criteria
11.5.1.2	Basis for Detector Location Selection
11.5.1.3	Expected Radiation Levels
11.5.1.4	Quantity to be Measured
11.5.1.5	Detector Type, Sensitivity, and Range
11.5.1.6	Setpoints
11.5.1.7	Annunciators and Alarms
11.5.1.8	Calibration, Maintenance, Inspection, Decontamination, and Replacement
11.5.2	System Description
11.5.2.1	Systems Required for Safety
11.5.2.1.1	Main Steam Line Radiation Monitoring System
11.5.2.1.2	Reactor Enclosure Ventilation Exhaust Radiation Monitoring System
11.5.2.1.3	Refueling Area Ventilation Exhaust Radiation Monitoring System
11.5.2.1.4	Control Room Ventilation Radiation Monitoring System
11.5.2.1.5	Control Room Emergency Fresh Air Radiation Monitoring System
11.5.2.1.6	RHR Service Water Radiation Monitoring System
11.5.2.2	Systems Required for Plant Operation
11.5.2.2.1	North Stack Effluent Radiation Monitoring System
11.5.2.2.2	South Stack Effluent Radiation Monitoring System
11.5.2.2.3	Radwaste Equipment Rooms Ventilation Exhaust Radiation Monitoring System
11.5.2.2.4	Charcoal Treatment System Process Exhaust Radiation Monitoring System
11.5.2.2.5	Recombiner Room and Hydrogen Analyzer Exhaust Radiation Monitoring System
11.5.2.2.6	Steam Exhauster Discharge and Vacuum Pump Exhaust Radiation Monitoring System
11.5.2.2.7	Radwaste Enclosure and Chem. Lab. Expansion Ventilation Exhaust Radiation Monitoring System
11.5.2.2.8	Air Ejector Offgas Effluent Radiation Monitoring System
11.5.2.2.9	Primary Containment Leak Detector Radiation Monitoring System
11.5.2.2.10	Hot Maintenance Shop Ventilation Exhaust Radiation Monitoring System
11.5.2.2.11	Liquid Radwaste Discharge Radiation Monitoring System
11.5.2.2.12	Service Water Radiation Monitoring System
11.5.2.2.13	Reactor Enclosure Cooling Water Radiation Monitoring System
11.5.2.2.14	Process Sampling System
11.5.2.3	Postaccident Systems
11.5.2.3.1	Primary Containment Post-LOCA Radiation Monitoring System
11.5.2.3.2	North Stack Wide Range Accident Monitoring System
11.5.2.3.3	Postaccident Sampling System
11.5.3	Effluent Monitoring and Sampling
11.5.4	Process Monitoring and Sampling

LGS UFSAR

TABLE OF CONTENTS (cont'd)

11.5.5	Postaccident Sampling Systems
11.5.5.1	System Description
11.5.5.1.1	Sample Points
11.5.5.1.2	Isolation Valves and Sample Lines
11.5.5.1.3	Piping Rack
11.5.5.1.4	Sample Station and Control Panels
11.5.5.2	Description of Sample Preparation/Chemistry and Nuclear Counting Facilities
11.5.5.2.1	Onsite Facilities
11.5.5.2.2	Arrangements for Offsite Analyses
11.5.5.3	Sample Collection and Transport Procedures
11.5.5.4	Chemical/Radiochemical Procedures
11.5.5.4.1	Sample Preparation
11.5.5.4.2	Chemical Analysis
11.5.5.4.3	Radiochemical Analysis/Gamma Ray Spectroscopy
11.5.5.4.4	Gas Analysis
11.5.5.4.5	Determination of Extent of Core Damage
11.5.5.4.6	Storage and Disposal of Sample
11.5.5.4.7	System Testing and Operator Training
11.5.5.5	Dose Rate Analysis
11.5.6	Radiation and Meteorological Monitoring System
11.5.6.1	General Description
11.5.6.2	RMMS Hardware Description
11.5.6.2.1	Radiation Monitoring and Display System
11.5.6.2.2	Meteorological Monitoring Display and Reporting System
11.5.6.3	RMMS Software Description
11.5.6.3.1	RMDS Software Description
11.5.6.3.2	MMDRS Software Description

LGS UFSAR

LIST OF TABLES

<u>TABLE</u>	<u>TITLE</u>
11.1-1	Noble Radiogas Source Terms
11.1-2	Halogen Radioisotopes in Reactor Water
11.1-3	Other Fission Product Radioisotopes in Reactor Water
11.1-4	Coolant Activation Products in Reactor Water and Steam
11.1-5	Noncoolant Activation Products in Reactor Water
11.2-1	Assumptions and Parameters Used for Evaluation of Radioactivity Releases
11.2-2	Liquid Waste Management System Flows
11.2-3	Expected Radionuclide Activity Concentration in Reactor Coolant and Main Steam Used for Evaluation of Radioactivity Releases
11.2-4	Decontamination Factors Used for Evaluation of Radioactivity Releases
11.2-5	Expected Holdup Times for Collection, Processing, and Discharge Used for Evaluation of Radioactivity Releases
11.2-6	Average Daily Inputs and Activities to the Liquid Waste Management System from Two Units
11.2-7	Batched Inputs to the Liquid Waste Management System from the Solid Waste Management System for Normal Operation of Two Units
11.2-8	Expected Radionuclide Activity Inventories of Liquid Waste Management System Components
11.2-9	Maximum Radionuclide Activity Inventories of Liquid Waste Management System Components
11.2-10	Liquid Waste Management System Component Parameters
11.2-11	Expected Yearly Activity Released from Liquid Waste Management Systems
11.2-12	Comparison of Maximum Calculated Radionuclide Concentrations in the Environment from Routine Liquid Releases to 10CFR20 Limits
11.2-13	Comparison of Maximum Individual Doses Resulting from LGS Units 1 and 2 With 10CFR20, Appendix I Design Objectives

LGS UFSAR

LIST OF TABLES (cont'd)

<u>TABLE</u>	<u>TITLE</u>
11.3-1	Expected Annual Activity Released from Gaseous Waste Management Systems
11.3-2	Assumptions and Parameters Used for Evaluation of Gaseous Releases
11.3-3	Offgas System Major Equipment Description
11.3-4	Comparison of Maximum Individual Doses Resulting from LGS Unit 1 & 2 With 10CFR50, Appendix I Design Objectives
11.3-5	Offgas System Equipment Malfunction Analysis
11.3-6	Release Point Data
11.3-7	Comparison of Maximum Calculated Radionuclide Concentrations in the Environment From Routine Atmospheric Releases to 10CFR20 Limits
11.4-1	Solid Waste Management System Tank Design Parameters
11.4-2	Solid Waste Management System Pump Design Parameters
11.4-3	Solid Waste Management System Process Equipment Design Parameters
11.4-4	Solid Waste Management System Flows
11.4-5	Wet Waste Input to the Solid Waste Management System
11.4-6	Dry Waste from Filters to the Solid Waste Management System
11.4-7	Expected and Maximum Shipping Cask Inventories
11.4-8	Expected Radionuclide Inventories of Solid Waste Management System Components
11.4-9	Maximum Radionuclide Inventories of Solid Waste Management System Components
11.4-10	Expected Annual Solid Waste Management System Containers to be Shipped and Activity Contents
11.5-1	Process and Effluent Radiation Monitoring Systems
11.5-2	Radiation Monitoring System Setpoints and Functions
11.5-3	Postaccident Sampling Dose Assessment
11.5-4	Gaseous Effluents Composition and Concentrations

LGS UFSAR

LIST OF TABLES (cont'd)

<u>TABLE</u>	<u>TITLE</u>
11.5-5	Liquid Effluents Composition and Concentrations

LGS UFSAR

LIST OF FIGURES

<u>FIGURE</u>	<u>TITLE</u>
11.1-1	Noble Radiogas Decay Constant Exponent Frequency Histogram
11.1-2	Radiohalogen Decay Constant Exponent Frequency Histogram
11.1-3	Noble Radiogas Leakage Versus I-131 Leakage
11.2-1	Deleted
11.2-2	Deleted
11.2-3	Deleted
11.2-4	Liquid Waste Management Process Flow Diagram
11.3-1	Gaseous Waste System Process Diagram
11.3-2	Deleted
11.3-3	Deleted
11.4-1	Deleted
11.4-2	Deleted
11.4-3	Solid Waste Management System Process Flow Diagram
11.5-1	Deleted
11.5-2	Deleted